November 9, 2018

Tanuja Vaidya
648 Mandfield Avenue
Ottawa, ON K2A 2T6

Dear Ms. Vaidya:

Re: Qualitative Pedestrian Level Wind Assessment
89 Richmond Road, Ottawa
GWE File No.: 18-157-DTPLW

1. INTRODUCTION

Gradient Wind Engineering Inc. (GWE) was retained to undertake a qualitative pedestrian level wind assessment in support of the proposed mixed-use residential/urban spa development located at 89 Richmond Road in Ottawa, Ontario. This report provides the qualitative assessment of pedestrian level wind comfort for the noted site based on drawings prepared by RLA Architecture in October 2018, consideration of existing and approved future surrounding buildings, statistical knowledge of the Ottawa wind climate, and experience with similar projects in Ottawa.

In the early stages of design development, a qualitative wind assessment is useful to identify any significant massing features or design elements which may adversely impact pedestrian activities within the study area, and to provide initial recommendations for mitigation strategies, as may be required.

2. TERMS OF REFERENCE

The focus of this qualitative pedestrian wind assessment is the proposed mixed-use residential/urban spa development located at 89 Richmond Road. The study site is situated approximately 100 metres west of Island Park Drive, on a parcel of land bounded by Patricia Avenue to the west, Mailes Avenue to the north, Island Park Drive to the east, and Richmond Road to the south.

The proposed development is a 6-storey rectangular planform mixed-use residential/urban spa building with its short axis fronting Richmond Road. The development is located directly between an existing 6-storey commercial and residential building to the southwest, and an existing 2-storey residential building to the northeast. The development features spa amenities from the basement level through Level 2, and residential units in the levels above. At grade, both the residential and spa entrances front Richmond Road, and an outdoor Zen garden is featured along the northwest side of the building. Level 3 cantilevers over the lower levels along the north and south elevations. The building steps back from the north elevation at Levels 5 and 6 to accommodate private outdoor terraces. The building reaches a maximum height of 20.1 metres from local grade to the top of the roof parapet.

Regarding wind exposures, the near-field surroundings of the development (defined as an area falling within a 200-metre radius of the site) are characterized by primarily low-rise massing in all directions, with three medium-rise buildings in the southwest quadrant along Richmond Road, and a parking lot approximately 100 metres to the northwest. The far-field surroundings (defined as the area beyond the near field and within a two-kilometer radius) are characterized in all directions by a moderately dense low-rise suburban exposure with a sparse distribution of taller developments scattered throughout. Approximately 1.5 kilometres from the development site the low-rise surroundings merge into the open exposure of the Ottawa River, from the west, rotating clockwise, to the northeast.

The ground floor plan is illustrated in Figure 1 (following the main text), with letter tags identifying wind sensitive pedestrian locations considered in this assessment.

3. METHODOLOGY

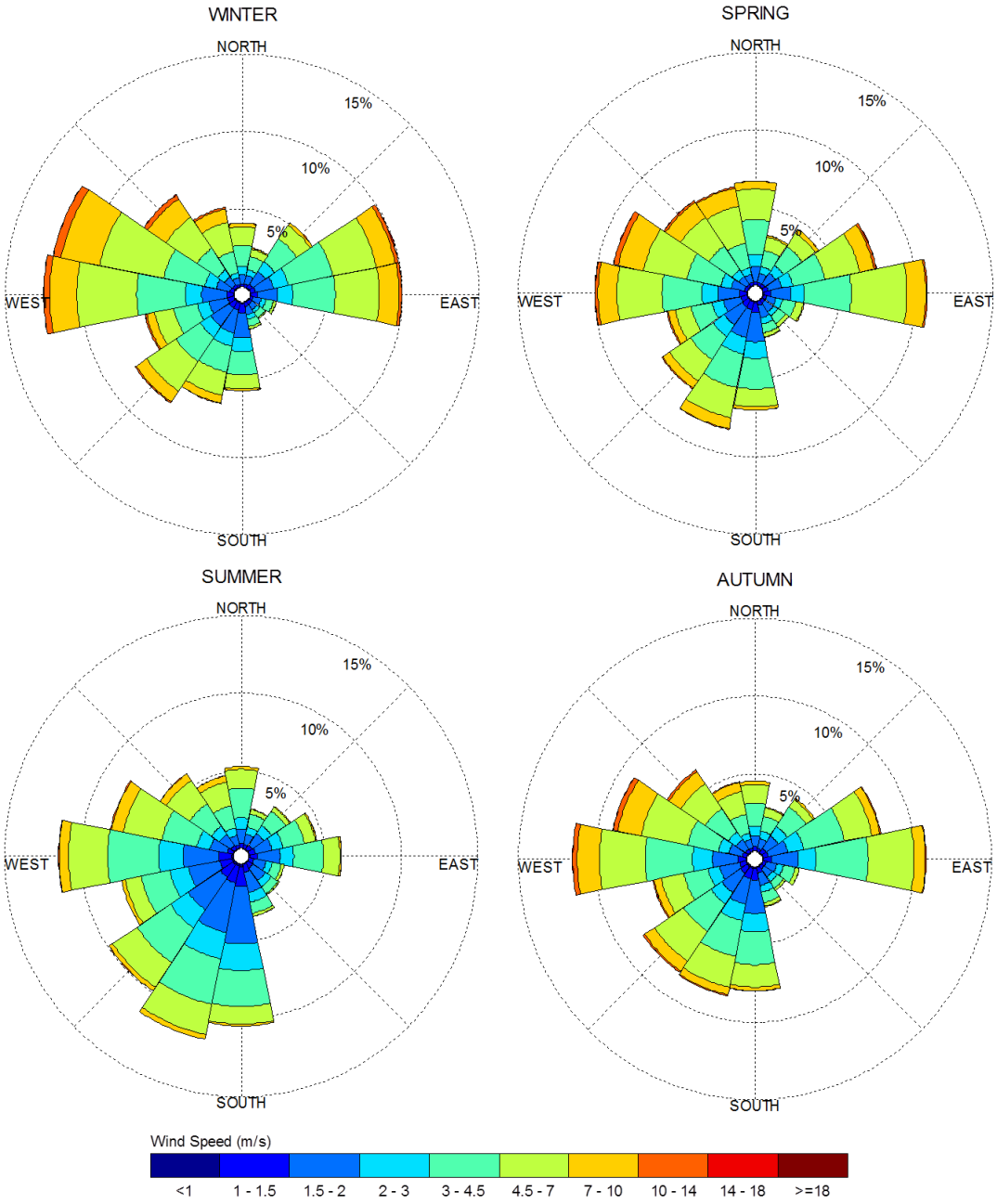
The main aspects of a qualitative pedestrian level wind assessment include (i) consideration of the statistical properties of the local wind climate; (ii) knowledge of wind flow behaviour in typical suburban environments; and (iii) an understanding of how common wind conditions relate to typical pedestrian activity types.

3.1. Ottawa Wind Climate

The statistical model of the Ottawa area wind climate, which indicates the directional character of local winds on a seasonal basis, is illustrated on the following page. The plots illustrate seasonal distribution of measured wind speeds and directions in km/h. Probabilities of occurrence of different wind speeds are represented as stacked polar bars in sixteen azimuth divisions. The radial direction represents the percentage of time for various wind speed ranges per wind direction during the measurement period. The preferred wind speeds and directions can be identified by the longer length of the bars. For Ottawa, the most common winds occur for westerly wind directions, followed by those from the east, while the most common wind speeds are below 10 metres per second (m/s). The directional preference and relative magnitude of wind speed changes somewhat from season to season. By convention in microclimate studies, wind direction refers to the wind origin (e.g., a north wind blows from north to south).

SEASONAL DISTRIBUTION OF WINDS FOR VARIOUS PROBABILITIES

MACDONALD-CARTIER INTERNATIONAL AIRPORT, OTTAWA, ONTARIO



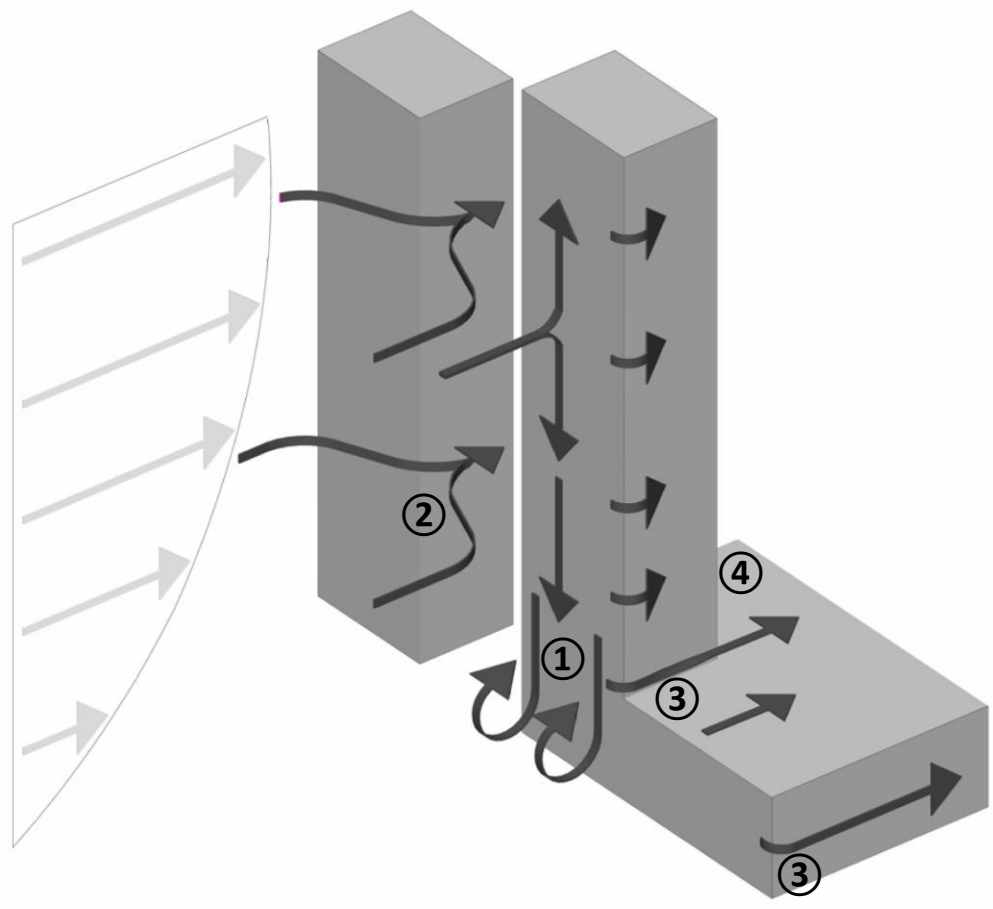
Notes:

1. Radial distances indicate percentage of time of wind events.
2. Wind speeds represent mean hourly wind speeds measured at 10 m above the ground.

3.2. Massing vs. Climate – Geometric Effects

The physical features of a development site that are most influential to the local wind conditions include the massing and relative spacing of surrounding buildings, the geometry and orientation of the study building, and the alignment of the study building with respect to statistically prominent wind directions.

Wind flow characteristics which combine to determine how conditions will develop include phenomena known as downwash, channelling coupled with acceleration, and shielding, as illustrated in the image below. Downwash ① relates to the effect of winds against a tall building, whereby much of the impinging flow on the windward side of the building, nominally below two-thirds of the total height, is directed to lower levels. Taller buildings with smooth façades and no podiums produce the strongest downwash effects at grade, while the presence of protruding balconies and a tower setback from the podium edge mitigates downwash effects at the ground level. Channelling ② refers to acceleration of wind through gaps between buildings, while acceleration of wind ③ occurs around building corners. Shielding ④ relates to calm zones on the leeward side of buildings, protected from prevailing winds.



3.3. Pedestrian Wind Comfort Guidelines

The pedestrian wind comfort guidelines used by GWE, which correspond to industry-accepted standards, are based on the correlation between a variety of pedestrian activity types and acceptable wind speed ranges for those activities. More specifically:

- Wind conditions are comfortable for *sitting* when gust wind speeds less than or equal to 14 km/h occur at least 80% of the time;
- Wind conditions are comfortable for *standing* when gust wind speeds less than or equal to 20 km/h occur at least 80% of the time;
- Wind conditions are comfortable for *strolling* when gust wind speeds less than or equal to 25 km/h occur at least 80% of the time;
- Wind conditions are comfortable for *walking* when gust wind speeds less than or equal to 30 km/h occur at least 80% of the time.

The GWE guidelines are based on gust wind speeds, since people are most sensitive to wind gusts rather than to constant wind speeds. The guidelines are applied to the intended use of an outdoor area. For example, an entrance to a building should be suitable for standing, but need not be suitable for sitting, while a public sidewalk need only be suitable for walking in most circumstances.

4. ANTICIPATED PEDESTRIAN COMFORT

Based on consideration of the proposed mixed-use residential/urban spa development at 89 Richmond Road in Ottawa, surrounding building massing, and the relationship to the local wind climate, the following statements summarize our assessment of wind comfort at key pedestrian areas.

Richmond Road Sidewalk, Inclusive of Residential and Spa Entrances (Figure 1, Tags A & B): The Richmond Road sidewalk area (Tag A) is indirectly aligned with prominent east-west winds travelling along the Richmond Road corridor, while remaining sheltered from the remaining wind directions by the surrounding suburban exposure. Overall, the sidewalk is expected by be comfortable for standing or better during the summer and autumn, and for strolling or better throughout the rest of the year, which is acceptable.

The building entrances fronting Richmond Road (Tag B) will experience additional wind protection from the study buildings façade, the setback of the building from the road, and the cantilevered balconies above grade. Therefore, the entrances are expected to be comfortable for sitting throughout the spring,

summer, and autumn months, becoming suitable for standing or better during the winter, which is considered appropriate.

Outdoor Zen Garden along North Elevation (Figure 1, Tag C): The outdoor Zen Garden along the northwest side of the development at grade will be well-sheltered from south quadrant winds by the study building itself, from westerly winds by the adjacent medium-rise building to the southwest, and from the remaining wind directions by the surrounding low-rise massing. In addition, the proposed 2.2 metre cedar fence around the perimeter of the space will further reduce the effect of oncoming winds, ensuring that the Zen garden will remain calm and comfortable for sitting or more sedentary activities throughout the year without the need for further mitigation.

Neighboring Amenity Terrace (Figure 1, Tag D): The grade-level outdoor amenity terrace along the north elevation of the neighboring 6-storey building is likely to experience a minor improvement in wind conditions with the introduction of the proposed development as a result of the study building buffering certain high-probability east quadrant winds. Principally, the introduction of the development is not expected to exacerbate the wind conditions currently experienced over the neighboring terrace.

Private and Shared Backyard Amenity Spaces (Figure 1, Tag E): The private and shared back yards to the north and west of the study site are sheltered from most prominent wind directions by the surrounding low-, and medium-rise massing, and are expected to be suitable for sitting during the summer, and for standing or better throughout the remaining seasonal periods, which is considered appropriate for the intended uses of the spaces.

Influence of the Proposed Development on Existing Wind Conditions near the Study Site: The introduction of the proposed development is not expected to significantly influence pedestrian wind comfort over neighbouring areas at grade, beyond those mentioned above. Although modest changes to wind speeds may occur upon introduction of the proposed development, nearby building entrances, sidewalks, laneways, amenity areas, parking areas, and other pedestrian areas are expected to continue to experience wind conditions similar to those that presently exist without the proposed building in place.

Applicability of Predictions: The forgoing statements and conclusions apply to common weather systems, during which no dangerous or consistently strong wind conditions are expected anywhere over the study site. During such extreme weather events, (e.g. thunderstorms, tornadoes, and downbursts), pedestrian

safety is the main concern. However, these events are generally short-lived and infrequent and there is often sufficient warning for pedestrians to take appropriate cover.

5. SUMMARY AND RECOMMENDATIONS

Based on a qualitative analysis of architectural drawings, surrounding building massing, and the Ottawa wind climate, the following general statements summarize our prediction of future wind conditions for the proposed mixed-use residential/urban spa development at 89 Richmond Road in Ottawa, Ontario.

1. Wind comfort at all grade-level pedestrian-sensitive locations across the full study site is expected to be suitable for the anticipated uses without mitigation. These areas include nearby sidewalks, outdoor amenity areas, building access points, and other pedestrian sensitive areas.

2. The introduction of the proposed building is not expected to significantly influence pedestrian wind comfort at neighbouring areas beyond the development site. In particular, nearby building entrances, sidewalks, laneways, amenity areas, parking areas, and other pedestrian-sensitive areas beyond the development site are expected to continue to experience wind conditions similar to those that presently exist without the proposed building in place.

The forgoing statements and conclusions apply to common weather systems, during which no dangerous or consistently strong wind conditions are expected anywhere over the study site. During such extreme weather events, (e.g. thunderstorms, tornadoes, and downbursts), pedestrian safety is the main concern. However, these events are generally short-lived and infrequent and there is often sufficient warning for pedestrians to take appropriate cover.

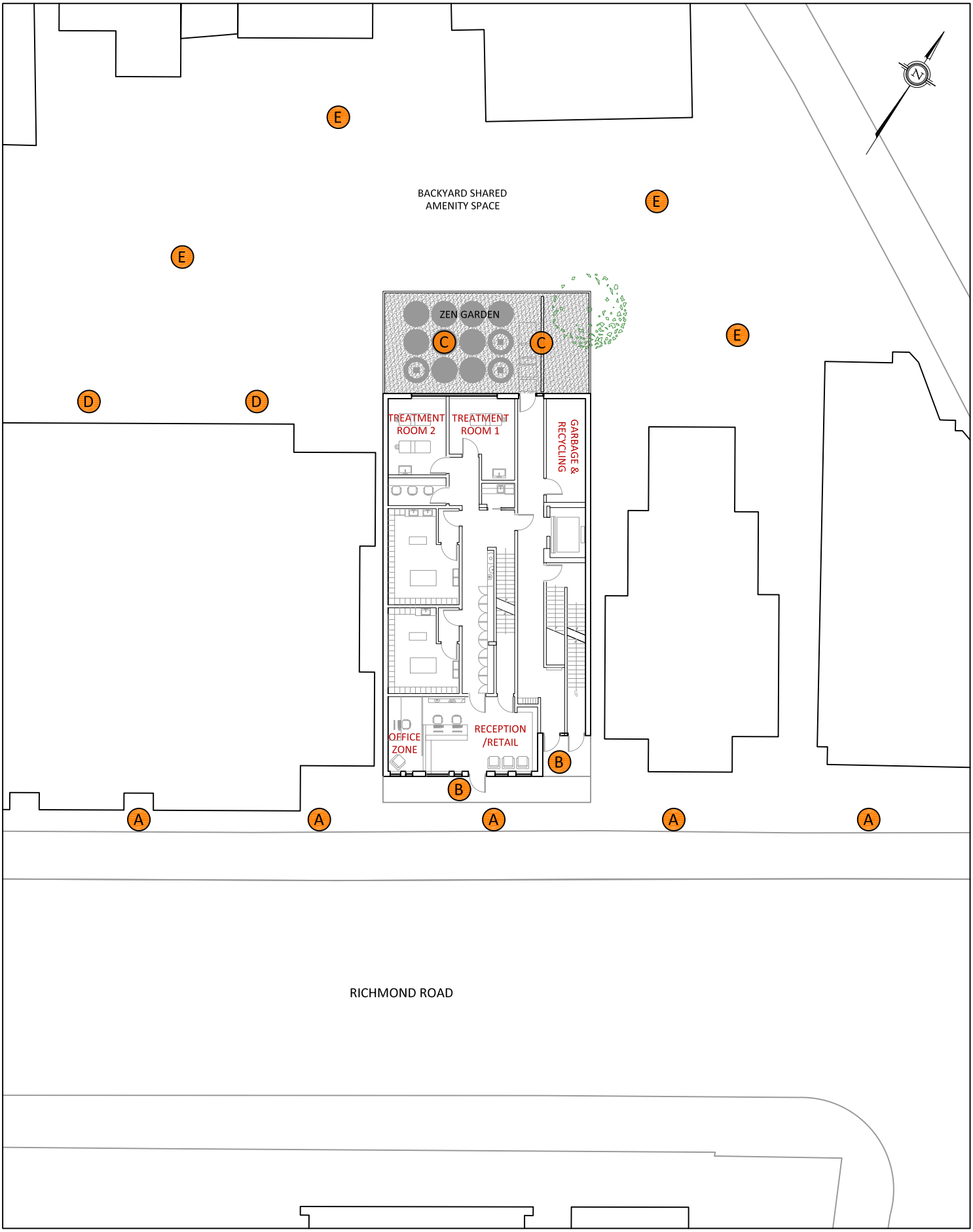
This concludes our qualitative assessment of pedestrian wind comfort. Please advise the undersigned of any questions or comments.

Sincerely,

Gradient Wind Engineering Inc.

Andrew Sliasas, M.A.Sc., P.Eng.
Principal

Nick Petersen, B.Eng., EIT
Junior Wind Scientist



127 Walgreen Road
Ottawa, Ontario
(613) 836 0934

GRADIENT WIND ENGINEERING INC

PROJECT	89 RICHMOND ROAD, OTTAWA QUALITATIVE PEDESTRIAN LEVEL WIND ASSESSMENT
SCALE	1:300 (APPROX.)
DRAWING NO.	GWE18-174-DTPLW-1
DATE	NOVEMBER 9, 2018
DRAWN BY	K.A.

DESCRIPTION

FIGURE 1:
GROUND FLOOR PLAN
WITH REFERENCE MARKERS